

MEMOIRS
OF THE
GEOLOGICAL SURVEY
OF
THE UNITED KINGDOM.

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*Figures and Descriptions*

ILLUSTRATIVE OF  
BRITISH ORGANIC REMAINS.

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DECADE V.  
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1856.

BRITISH FOSSILS.

DECADE THE FIFTH.

IN apologizing for the unavoidable delay which has taken place in the publication of this Decade, owing to the much lamented decease of Professor Edward Forbes, it is right to state that the materials left behind by him were scanty, and had been unfortunately mislaid a short time before his death. The first description only, that of *Solaster Moretonis*, had been fully written by him; of the others, we had here and there notes on the distinctive characters of the species, and of his views as to their synonymy or history. The plates, however, had been all engraved under his own eye, and the specific designations under which he wished the figures to stand, were recorded in the last edition of Morris's Catalogue. He had there also applied MS. names to a number of species to be described in the Decade.

In a few cases only it has been found necessary to alter some of these names; and this has been done in deference to an authority which would have been gladly admitted by Professor Forbes. To Mr. S. P. Woodward, of the British Museum, we are indebted for all the notes respecting these supplementary species; and he has also furnished full descriptions of three of the plates. With this valuable aid, and the friendly communications of Dr. T. Wright, of Cheltenham, we can present the Decade in nearly as complete a form as it would have possessed had our friend and Master lived to finish it. We miss, however, his lively remembrance of the living species, and his practical acquaintance with their variations,—deficiencies not to be supplied by reference to his published works.

Of the ten species figured three are new,—*Solaster Moretonis*, *Cidaris Carteri*, and *Pygaster conoideus*. Of the other genera, *Diadema*, *Echinopsis*, and *Echinus* present us with well-known types from the Oolitic rocks, which are continental as well as British. *Pyrina* is a rare genus in England, and in this, and the two figured species of *Pygaster*, we have excellent examples of that division of the *Cassidulidae* in which the ambulacra are of uniform character throughout. Several genera of this type have been figured in the Decades. The *Pygaster semisulcatus* is a critical species, and its synonymy is now for the first time cleared up. *Hemiaster Murchisonia* is another instance of the same kind, and belongs to a large genus of closely allied species. The *Brissus Scillæ* is a Crag species still existing in the Mediterranean. None of these nine genera have before appeared in the Decades.

There are engraved plates sufficient for another fasciculus, upon which Professor Forbes left no memoranda, except the names of the species. These Plates will be published at a future period.

JOHN W. SALTER,
Palæontologist.

Geological Survey Office, Jermyn Street, London,
February 1856.

BRITISH FOSSILS.

DECADE V. PLATE VIII.

PYGASTER CONOIDEUS.

[Genus PYGASTER. AGASSIZ (1834.) (Sub-kingdom Radiata. Class Echinodermata. Order Echinoidea. Family Cassidulidæ.) Orbicular, depressed or sub-conic; ambulacra simple throughout; tubercles perforate (and crenulate?), disposed in very regular series in both areas; anus very large, superior, generally placed near the plates of the disk; mouth decagonal, no tubercles round it.]

DIAGNOSIS. *P. pyramidalis pentaedrus*, *margini postico subacuto; tuberculis minutis et ut sparsis, subtus majoribus et crebris; ambulacris elevatis, angustis; ano modico, nec dimidium interambulacri planati efficiente.*

SYNONYMS. *Pygaster conoideus*, WRIGHT, Ann. and Mag. Nat. Hist. (1852), vol. ix. p. 91. pl. 3. fig. 1.

The only cabinet that appears to contain this well-marked species is that of our friend Dr. Wright, who has lent it us for figuring. We may expect soon a full account from him, and of other British species not here mentioned, in the volumes of the Palæontographical Society.

It is more conoidal than any of its genus, the anterior and lateral surfaces forming angles of from 50° to 55° with the base, and the posterior side an angle of about 42° . Its height is an inch and $\frac{3}{16}$, and its diameter nearly $2\frac{1}{2}$ inches either way (Wright). The base is nearly flat so far as it can be seen. The ambulacra are narrow and prominent, and are placed at equal distances, each being less than one fourth the width of the intervening spaces. The three anterior radiate in straight lines from the depressed disk, which is lost in our specimen; the two posterior curve first outwards to avoid the edges of the anal opening, and then proceed straight to the margin.

The primary tubercles on the ambulacra are arranged in two rows along the margin, and are small and inconspicuous; there are about thirty-two on the upper face. Between these are two other rows, less regular, but reaching halfway up, or sometimes further, and near the margin one or even two rows are introduced within these. On the under side the tubercles increase much in size, and are in four regular rows. The areolæ are very flat and depressed round their margin, which is often faintly radiated; there is no appearance of crenulation on their upper edge. The boss is small and bead-like, and shows the perforation well. There is a circle of granules round each areola, and scattered equal-sized granules, without any secondary tubercles between, over the surface.

The avenues are narrow and rather sunk, the pores in very regular single file (not at all undulated as in *P. semisulcatus*.) Each pair consists of a transverse and an oblique one, not differing much in size, and separated by a small prominent ridge, not a tubercle. There are about three ambulacral plates to each primary tubercle, so that there are nearly ninety plates in a series on the upper face. The pairs of pores are a little more distant below.

The interambulacral tubercles are like the others in size on the upper and lower faces; and their arrangement is very similar to that in the last-described species, viz., in transverse rows on the inner half of each ambulacral plate, and in scattered order on the outer portion, where they are decidedly larger, and, as our fig. 5 shows, often irregular; and sometimes they are absent. On the marginal plates there are often five tubercles in a row on the inner half, and three double rows on the outer, but above they are much fewer and less regular. About seventeen plates occur in an interambulacral series, much bent in outline, as shown in figure 5. The primary row (*a*) of tubercles occupies the median angle as usual.

The tubercles on the under surface are too wide apart in our figure. They are in irregular transverse rows, and their smooth depressed areolæ in some parts nearly touch, leaving room only for the granules between. We can see no trace of crenulation on the edges.

Affinities.—Except with the pyramidal variety of *P. semisulcatus*, before noticed, there is no species with which this can be compared. The small regular tubercles well distinguish it from that, and, together with the elevated ambulacra, seem to afford a good specific character. They are raised not only in the middle, but from their edges, and the avenues consequently sunk in a shallow groove.

History.—Described by Dr. Wright in the paper above quoted, and admitted into Morris's Catalogue, 2nd edit. by Prof. E. Forbes. He left no notes upon the species.

Locality and Geographical Position.—INF. OOLITE, in the peagrit of Crickley Hill, north of Cheltenham. Mr. Lycett's specimen came from the INF. OOLITE, near Stroud. (Dr. Wright.)

J. W. SALTER.

EXPLANATION OF PLATE VIII.

Fig. 1. Dr. Wright's specimen from Crickley Hill. Upper side; the disk plates lost, and the space occupied by them confused with the anal opening.

Fig. 2. Under side of do. only partly relieved from the stone.

Fig. 3. Posterior view, showing the height of the test.

Fig. 4. Lateral view, left side.

Fig. 5. Plates and avenues, with tubercles and granules.

Fig. 6. A tubercle from the interambulacral area, upper surface.

Fig. 7. Do. from the under side.

Other British Species of Pygaster.

As Dr. Wright will give a full description of this genus in his volume on the *Echino-dermata* (Palæont. Soc. Trans.), it will be only necessary to notice the other British species very briefly. He has furnished us with the following memoranda:—

2. "*Pygaster Morrisii*, Wright, Annals and Mag. of Nat. Hist. vol. 9. 2nd series, pl. iv. fig. 1.

"Test pentagonal depressed; marginal fold very tumid; single interambulacrum much truncated; ambulacral areas wide, convex, and prominent, with six rows of tubercles; interambulacra wide, with the tubercles in regular rows, from 20 to 22 rows at the equator; base depressed towards the mouth opening, which is small; anal opening large, occupying two-thirds of the dorsal portion of the single interambulacrum.

"*Locality*.—CORNBURASH, near Stanton, Wilts. (Dr. Wright.)

"3. *Pygaster umbrellæ*, Agassiz, Descript. Echinoder m. Foss. de la Suisse. part 1. p. 83. tab. xiii. fig. 4.

"Test large, very pentagonal, more or less elevated; ambulacral areas narrow, with two marginal rows of tubercles throughout, and two inner rows which commence at some distance from the peristome and extend only a short way above the marginal fold; interambulacral areas wide, with from 16—18 rows of tubercles at the equator; the tubercles are arranged in threes obliquely across the plates, and thus produce irregular rows; the anal opening is distinctly pyriform, occupying rather more than one-half the length of the dorsal surface of the single interambulacrum; base concave; mouth opening small; peristome decagonal, equal-lobed; tubercles on the base, larger, and more regularly arranged, than those on the upper surface.

"*Localities*.—CORALINE OOLITE, Calne, Farringdon, Malton; specimens from each of these localities are in the collection of Dr. Wright.

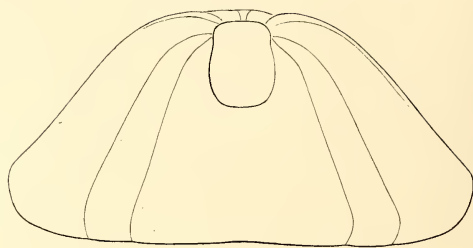
“The stratigraphical distribution of the four British Oolitic *Pygasters* is as follows:—

<i>Pygaster semisulcatus</i> ,	Inferior Oolite and Great Oolite;
<i>Pygaster conoideus</i> ,	Inferior Oolite ;
<i>Pygaster Morrisii</i> ,	Cornbrash ;
<i>Pygaster umbrellæ</i> ,	Coralline Oolite.

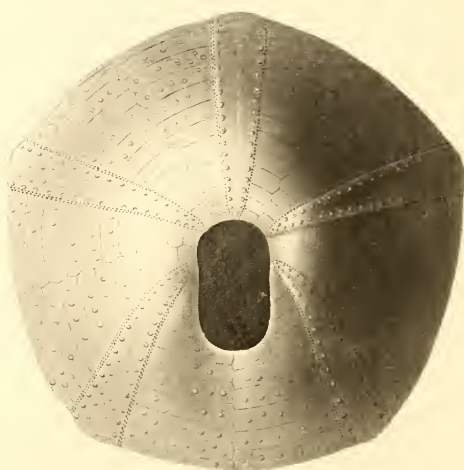
“It was an error in the determination of the species, which led Professor Phillips to state that *Pygaster semisulcatus* was found in the Coralline Oolite of Yorkshire, that form never yet having been found in Yorkshire out of the Whitwell beds,—Inf. or Great Oolite.”

March 1856.

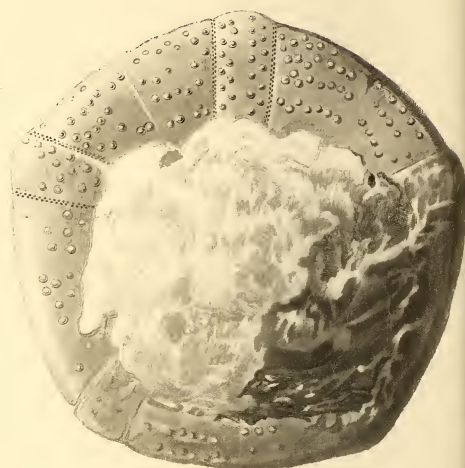
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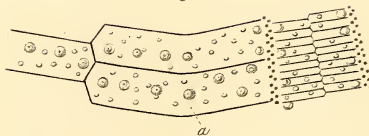
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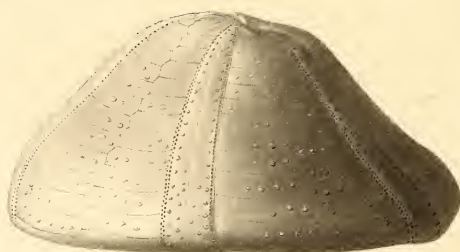
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PYGASTER CONOIDEUS — *Wright.*